

Notice of Allowability	Application No.	Applicant(s)	
	09/885,233	EVANS, PATRICK J.	
	Examiner	Art Unit	
	Yelena G. Gakh, Ph.D.	1743	

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Interview on 03/15/04.
2. ☒ The allowed claim(s) is/are 20-29.
3. ☒ The drawings filed on 20 June 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>03/15/04</u> . |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date <u>06/20/01</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

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DETAILED ACTION

1. The application is a divisional of US application No. 09/273,958, now US Patent No. 6277329. Claims 20-29 are pending in the application.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Barry F. McGurl on 03/15/04.

The application has been amended as follows:

- a, In Cross-Reference to Related Application, after "Match 22, 1999" insert -- now US Patent No. 6277329 --.
- b, In claim 20, step (c),
after oxygen add "with a hydrogen sensor capable of detecting hydrogen in carrier gas equilibrated with hydrogen dissolved in an aqueous medium at a concentration of on the order of 0.1 nM".

The following is an examiner's statement of reasons for allowance: the closest prior art, e.g. the one cited by the Applicants on page 3 of the specification, "equilibration of dissolved hydrogen in water with a carrier gas followed by removal of co-existing gases (e.g. oxygen, hydrogen sulfide, carbon dioxide) that can interfere with or dilute hydrogen during analysis has been attempted but not at sufficiently low detection limits". The same is true for the method taught by Westinghouse Electric Corporation (Research Project, Final Report, 1992, IDS): the disclosure teaches possible interferences from the mentioned gases in the method comprising detecting hydrogen dissolved in liquid by measuring its equilibrated amount in gas, but with insufficient sensitivity. Additional prior art:

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Terai et al. (US 4,454,748, 1984) disclose a method and “apparatus for measuring the content of hydrogen dissolved in a molten metal”, comprising passing a carrier gas through the molten metal to get an equilibrium of the hydrogen concentration in the metal and carrier gas and measuring hydrogen concentration in the carrier gas. The disclosure does not mention any interfering gases and necessity of their removal from the carrier gas.

Spicar (US 5,339,672) teaches “monitoring of gas dissolved in oil” by equilibrating hydrogen dissolved in the oil with hydrogen in a carrier gas; however, no problems with interfering gases are indicated in the patent, since much higher hydrogen thermal conductivity is used in this method, which makes its detection very selective.

Gibeault et al. (US 6,324,891 B1, filed 03/15/1999) disclose “method and apparatus for monitoring gas(es) in a dielectric fluid” with selective extraction of a target gas from the fluid and detecting it in the gaseous phase; the extraction is performed by using semipermeable membranes selective for different gases, rather than passing a carrier gas.

Tsukioka et al. (IEEE Trans on Electrical Insulation, 1981) disclose method and apparatus “for continuously monitoring hydrogen dissolved in transformer oil” by using a polyimide membrane which has a selective permeability only for hydrogen, thus removing all possible interfering gases from the measured gas. No carrier gas is applied in this method.

Robinson et al. (Appl. Environ. Microbiol., 1981), teach a “method for measuring dissolved hydrogen in anaerobic ecosystems: application to the rumen”, comprising transferring dissolved H₂ to a CO₂ headspace with the detection limit of 10 pmol of H₂/ml of water.

Pauss et al. (Biotech. Bioengin., 1990) disclose “continuous measurement of dissolved H₂ in an anaerobic reactor using a new hydrogen/air fuel cell detector with recognition of effects of interfering gases, such as water, oxygen, methane and hydrogen sulfide; however, the detection concentration range for the detector is 80-770 nM.

Cord-Ruwisch et al. ((Biotech. Bioengin., 1997) describe “dissolved hydrogen concentration as an online control parameter for the automated operation and optimization of anaerobic digesters” with a review of existing methods for detecting dissolved hydrogen, which do not comprise steps of claim 20 of the instant application.

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Chapelle et al. (Environ. Sci. Technol., 1997) review “practical considerations for measuring hydrogen concentrations in groundwater”; no method steps recited in claim 20 are discussed in the review.

Kambell et al. (Proc. Conf. Hazar. Waste Resear., 1998) teach “determining dissolved hydrogen, methane, and vinyl chloride concentrations in aqueous solution on a nanomolar scale with the bubble strip method”, which is the method described by the applicants as the only method which allows detecting nanomolar concentrations of dissolved hydrogen, but which is different from the method disclosed in the instant application and is time-consuming.

Therefore, the prior art does not teach or fairly suggest the method recited in claim 20, which makes the recited method allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Claims 20-29 are renumbered as claims 1-10.

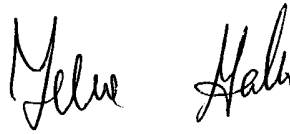
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yelena G. Gakh
3/17/04

Handwritten signature of Yelena G. Gakh in cursive script.